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Intelligence Memorandum

Communist China: Electric Power for Szechwan's Military-Industrial Expansion

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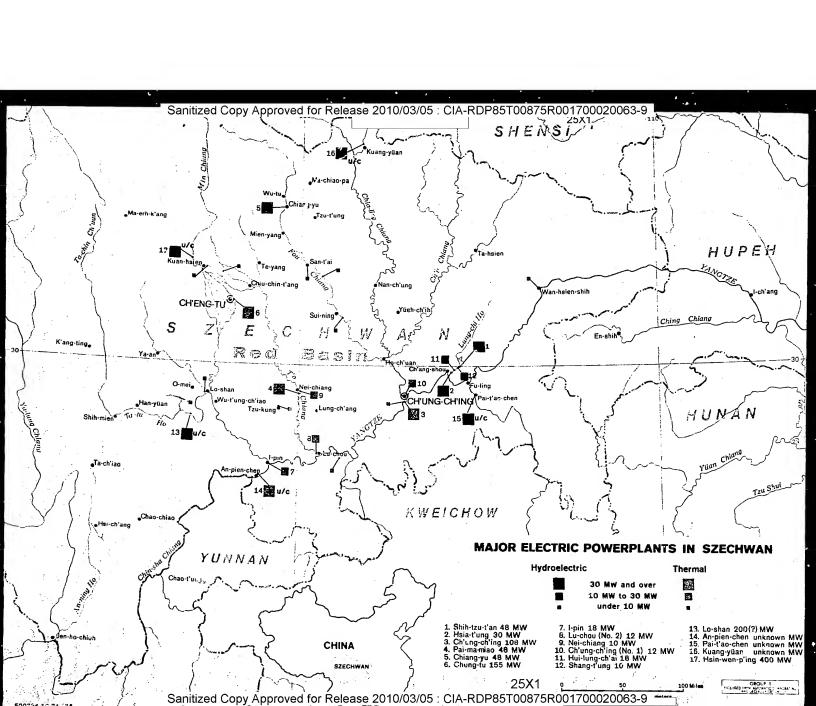
CENTRAL INTELLIGENCE AGENCY Directorate of Intelligence October 1971	25
INTELLIGENCE MEMORANDUM	
COMMUNIST CHINA: ELECTRIC POWER FOR SZECHWAN'S MILITARY-INDUSTRIAL EXPANSION	
Introduction	
1. Since at least 1969, the Chinese Communist press has stressed economic development of China's hinterland as a key defense measure.	
large-scale military and industrial construction programs have been under way for some time in the interior province of Szechwan China's most populous province and one of its most important new industrial areas. This memorandum discusses the capability of Szechwan to supply the electric power necessary for maintaining a stepped-up schedule of military-industrial development. The probable sources of power for the industrial facilities now under construction are identified. The present status of Szechwan's electric power industry and the likely lines of future development are also discussed.	
Discussion	
Background	
2. Szechwan, one of China's most important provinces, is about the size of France, with roughly twice the population – approximately 90 million to 100 million people. Located in the same latitudes as Texas, Szechwan has remained stable as an administrative unit since 965 A.D. when	

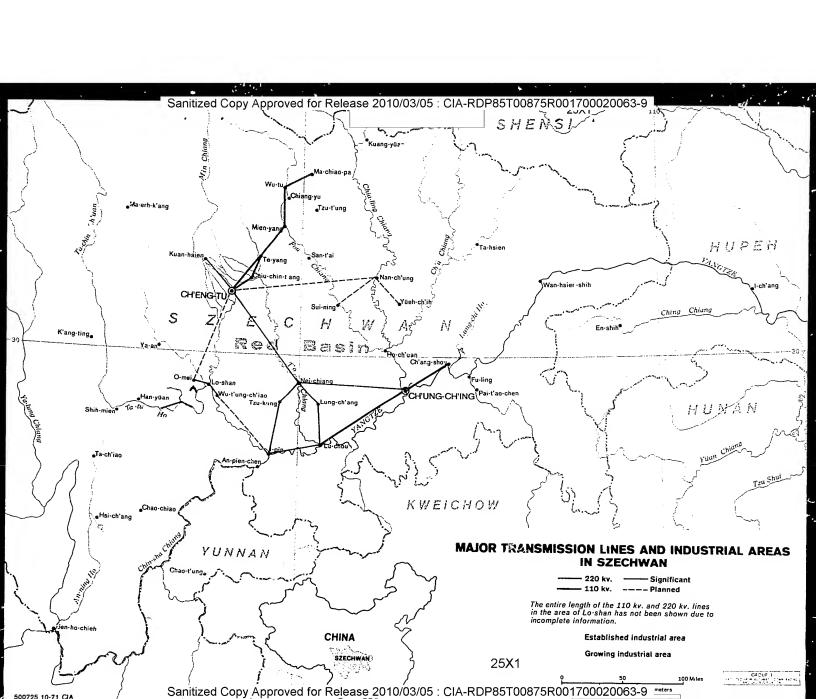
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an abundance of many other natural resources. The Red Basin itself contains natural gas and petroleum reserves, as well as diversified mineral deposits. To the north and southwest, the formidable mountain belt enclosing the basin yields fairly good grades of coal and iron ore. Sizable reserves of nonferrous ores lie south of the basin. 5. For many years, Szechwan has been known as the "garden of Asia" because of the abundance and variety of its agricultural production. Under the Chinese Communists, however, the province is being transformed from a predominantly agricultural region into a region with a rapidly increasing industrial component. For example, textiles, steel, and nonferrous metals are produced in this area; and sizable food processing and chemical industries have been developed. The metal fabrication, machinery, and electronics industries are expanding at a priority pace. Lastly, increasing numbers of weapons facilities are being built in the region. This rapid buildup of Szechwan's industrial muscle means a parallel increase in the need for electric powerplants and transmission facilities.	the province is the heart of Szechwan's economy. The potential for industrial and agricultural development in the basin is high. Ch'ung-ch'ing (formerly called Chungking) and Ch'eng-tu, the two major cities, are traditional market centers and are served by a network of large navigable rivers such as the Yangtze and the Min. A plan for the development of the Yangtze River was formulated during the Nationalist Chinese era with help from the United States. During the 1950s, the Chinese Communists undertook, with Soviet assistance, further planning for the comprehensive development of the entire Yangtze River Basin. Initial planning focused on development of dams and hydroelectric stations in Szechwan, which has nearly 60% of the hydroelectric potential of the Yangtze. These plans, which have been pursued in fits and starts in past years, now appear to	
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6. The generation and transmission of electric power in Szechwan		

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The two major industrial areas and users of electric power are centered around Ch'eng-tu in the west side of the basin and Ch'ung-ch'ing in the southeast. These areas have rudimentary transmission grids (Figure 2). The transmission system is not connected to any other system outside the province.

- 7. Szechwan has a total generating capacity of about 650 megawatts (MW). The individual plants are not large even by Chinese standards. The Ch'eng-tu heat and powerplant and the Ch'ung-ch'ing No. 507 plant are Szechwan's biggest 155 MW and 108 MW, respectively. Additional power for the Ch'ung-ch'ing area comes from a cascade of hydroelectric plants on the Lung-chi River including the Shih-tsu-tan, Hui-lung-chai, Shang-t'ung, and the Hsia-t'ung plants with a total capacity of 106 MW. The 48 MW Pai-ma-miao plant at Nei-chiang is connected to Ch'eng-tu and Ch'ung-ch'ing by a probable 110 kilovolt (kv) line. The Chiang-yu plant, with a capacity of 48 MW, mainly serves the area north of Ch'eng-tu.
- 8. In Figure 1, electric powerplants have been divided into three sizes to emphasize their relative importance. Powerplants with capacities in the range of 30 MW and above account for 437 MW, or two-thirds of Szechwan's generating capacity. These plants, however, produce substantially more than two-thirds of the province's total kilowatt hours (kwh) because they are used at a higher rate than smaller plants. Those plants ranging from 10 MW to 30 MW have an aggregate capacity of 80 MW. Very small urban powerplants less than 10,000 kw have a total capacity of approximately 100 MW. The rural electrification stations in the province, which use very small generators, probably account for about 33 MW of the province's total 650 MW capacity.
- 9. Szechwan was a minor producer of electric power until the late 1950s when the larger thermal-electric powerplants began to come into operation. Electric power production in the province has grown from 240 million kwii in 1952 to 1.8 billion kwh in 1970, or 3% of the national total. The low average rate of utilization of electric power capacity in the past few years in Szechwan is attributable to the province's sluggish recovery from the industrial slowdowns of 1967-68 during the Cultural Revolution. The sharp increase in industrial production reported by Szechwan thus far in 1971 suggests an increase in the rate of use of electric power capacity.
- 10. The province's more important powerplants, including the larger thermal plants, are now 15 to 20 years old. Part of the equipment at some of these plants, however, is never because of subsequent additions to

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	capacity. In developed countries, 20-year-old thermal plants tend to be used only at times of peak load. They are not used for base load, because they are less efficient fuel users and are therefore more costly to operate than modern plants. In Szechwan, and in some other parts of China, these thermal plants remain on base load because the level of development in the electric power industry does not meet the increasing demand for electric power, and there is no national transmission grid to even out loads. The need for more electricity in Szechwan overrides the problem of fuel costs.	
	Users of Electric Power	
	11. Industry is the largest and most rapidly growing consumer of electric power in Szechwan. Agriculture enjoys a much lower priority. The rolling, hilly terrain, which characterizes the agricultural areas of the province, is conducive to good drainage and eliminates much of the need for water control equipment such as electric pumps. The high elevation of many of the fields also makes the extensive use of electricity for irrigation both difficult and uneconomical.	
	12. Little is known about electric power consumption by households. It can be assumed, however, that the household sector in Szechwan is consuming more electricity each year — as is true throughout China — although the increase is not very significant. Electric lighting is the main household use of electricity in China.	
	New Users and New Powerplants	
25X1	13. Several major construction projects have been discovered recently in Szechwan These new industrial plants will be heavy users of electric power, and the five major powerplants now under construction (see Figure 1) are designed largely to service their needs.	25X1
	The dam	
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	and powerplant are on the Ta-tu River, and the two sites are being connected by a 220 kv power line. The powerplant will have an eventual capacity of at least 200 MW and will be able to supply some power to other industry in the area since much of the capacity will be backup reserve capacity to insure a	25X ²
	continuous supply The power project was begun in 1965-66 and will probably not be completed before 1973.	25X′
		25X ²
	15. Electric power needs in the Lo-shan District are becoming substantial. For example, the Lo-shan dam construction projects themselves are power consumers. In addition, two large unidentified industrial complexes have been discovered in the area. In nearby O-mei, one of the largest cement plants in China recently went into operation.	25X′
25X1	Local industry and households in the district also require increasing amounts of electric power.	25X1
	16. A second new area of industrial construction centers around a complex located 15 miles southwest of Ch'ung-ch'ing. This complex is a substantial undertaking, and it is not clear where its power supply will come from. Some power could come from the Nei-chiang powerplant, whose main consumers have not so far been identified.	25X1
	17. In the southernmost part of the province on the Yunnan border, still another new industrial area centers around the large Jen-ho-chich iron and steel complex (see Figure 2). Electric power is provided by two thermal-electric plants in the area. The plants are physically located in Yunnan.	
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the province are adequate. In any case, the construction of five new

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powerplants with a possible total capacity of 1,200 MW suggests that the authorities are anticipating an enormous increase in demand for power in the region. Most of this new capacity will probably be completed during the Fourth Five-Year Plan period (1971-75). By 1975, yearly production in Szechwan could surpass 6 billion kwh. Ultimately, the power facilities of the province may provide a significant contribution to the development of other provinces.

The Longer Run

- Over the longer run, most of Szechwan's electric power generating 23. capacity will take the form of hydroelectric plants. They will be very large because of the tremendous waterpower in the region. Szechwan contains one-fourth of China's potential hydroelectric power, and advantageous sites for hydroelectric development in the province are located near the industrial cities and the important mineral deposits. The geological conditions of Szechwan's rivers lend themselves to hydroelectric development. Because of the rocky beds of the narrow gorges and the steep gradient of the rivers, less concrete and earthmoving work is needed per kilowatt of capacity. In other parts of the world, capital investment per kilowatt of capacity installed in hydroelectric stations may run 200% to 400% higher than in thermal-electric plants. The cost differential is on the average only 50% higher in Szechwan, and little or no significant difference in cost may exist between very large-capacity hydroelectric and thermal plants in the province. The trend toward developing hydroelectric power is reinforced by the fact that Szechwan is not a major coal producer.
- 24. Given the natural advantages of terrain in the upper reaches of the Yangtze, long-range plans to "develop a unified system of major water-power projects directed toward the complex solution of the problems of flood control, irrigation, navigation, and electric power generation in the Yangtze River Basin" have been considered since the mid-1940s. The Chinese Communists resumed serious planning in the mid-1950s, began work on surveys in the late 1950s, and presently may be placing a high priority on execution of the plan. The plan has been referred to as taking place in two stages. The major tributaries of the Yangtze would be developed first and then the Yangtze itself. The whole project involves several provinces, but the first stage mainly involves Szechwan.
- 25. Originally, the first stage of the Yangtze River plan was to be undertaken during the Second Five-Year Plan (1958-62). Each of the major tributaries in Szechwan was surveyed for possible dam sites. In some cases, construction was started, but most of the construction was halted with the failure of the Great Leap Forward which had superseded the five-year

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plan. Two dams that were being built on the Min River as part of a planned cascade of eight dams were halted in the early 1960s because the dam sites turned out to be poorly chosen. The Hsin-wen-p'ing Dam is now under construction in the same general area on the Min River. The new hydroelectric stations now being built in the province indicate that the first stage of the plan is moving again. Presumably, such examples of wasted resources as the silting up of the San-men Dam on the Yellow River and the scrapping of the Min River projects have led to more care in the planning of this massive undertaking.	
26. The second stage of the plan was to dam the Yangtze River itself over a period of 20 years starting sometime in the 1970s. Three main high dams were to be built above the point at which the river reaches the eastern plains — two in Szechwan and one in Hupeh. The first of the Szechwan dams was to be located where the Yangtze leaves the Tibetan plateau near the city of I-pin and was to have a powerplant capacity of 4,000 MW. The second dam, to be located in the Mao-erh Gorge 125 miles below the first dam, was to have a powerplant capacity of 6,000 MW. The dam which was to be built new ch'ang, Hupeh Province in the Three Gorges Area, was to have a powerplant capacity of over 13,000 MW. The second stage was not expected to begin during the Fourth Five-Year Plan (1971-75), and there is no evidence that the two dams in Szechwan are under construction. However, work may have begun on the Three Gorges Dam.	
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27. The significance of these hydroelectric complexes lies in the speeding up of the time when Szechwan will become the heart of a sizable electric power transmission grid. The first link with an outside system is likely to be from eastern Szechwan into Hupeh. A second link may run south to K'un-ming in Yunnan Province serving Jen-ho-chieh along the way. A third interconnection may run northward along the Ch'eng-tu - Pao-chi railline to the Lan-chou grid in Kansu Province. By the end of the century, electric power from China's hinterland may be serving such cities as Peking, Shanghai, and Canton.	

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Conclusions

- 28. China is rapidly building large electric power facilities to support new military and industrial construction programs in the strategic hinterland province of Szechwan. The choice of Szechwan as a center for military-industrial development was dictated in part by the excellent hydroelectric resources of the area.
- 29. By the middle 1970s, Szechwan's present electric power capacity of 650 MW may nearly triple. This would surpass the present capacity of Kirin, one of northeast China's highly industrialized provinces. Yearly electric power production in Szechwan could increase from the present estimated 1.8 billion kwh to more than 6 billion kwh by 1975.
- 30. A longstanding plan for the development of the Yangtze River Basin now appears to be under way in earnest. Szechwan contains nearly 60% of the hydroelectric potential of the Yangtze River and its tributaries. Construction projects on the tributaries are now active, and the plans envision the building of three huge hydroelectric complexes on the Yangtze River two in Szechwan and one in Hupeh. Although construction has not yet begun on the two Szechwan dams, work has probably started on the largest high dam planned for the Yangtze near I-ch'ang in western Hupeh. This dam and powerplant will be part of a unified electric power system centered in Szechwan. If these building programs are completed by the end of the century, Szechwan and western Hupeh may contain a power system which will be transmitting electricity to such distant cities as Peking, Shanghai, and Canton.